



## Monitoring Concept for Torrential Barriers

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One part of an integrated protection concept are the structural mitigation measures, including torrential barriers. Beginning in the eighties of the ninetieth century a lot of torrential barriers had been built in the Austrian alps, to protect human settlement areas against floods, debris flows and avalanches. At the end of the seventies of the twentieth century concrete and reinforced concrete barriers replaced traditional ones, as barriers made of timber, boulders and building stones. Beside the design of these new concrete and reinforced concrete protection structures the already existing ones have been improved or rebuilt as well. Especially in the time after the Second World War a lot of new structures and protection systems had been built. In the last years the number in design of new buildings decreases whiles the number of maintenance and rebuilt activities increases.

In the last decade there are many projects established concerned with maintenance, improvement and restructuring. But until now no standardised procedures for monitoring, assessment and maintenance of torrential barriers are available in Austria. Therefore there was a big demand for the development of an Austrian Standard (ONR) regarding the design and sustainment of such structures. The recommendations of the ONR are developed under the claim to take care on economical, practical and safety aspects.

The monitoring concept developed in the context of the above mentioned Austrian standard is divided in two parts, the inspection and the measurement or intervention part. The main target of the inspection part is to assess the condition and the reliability in a comprehensive reliable manner. This is guaranteed by the comparison of the actual state with a reference state. To identify the actual state, standardized instruments are

developed. These instruments can be divided in the operational instruments, like three different control levels, the instruments of documentation, like the control minutes and databases and the instruments of assessment. These standardized instruments should allow a comparable condition levels over the whole federal territory of Austria. A consistent and comparable description of the damages of the structures is assured by well developed control minutes and a damage catalogue. This catalogue is based on the experience of practitioner and on the theoretical background of researchers. The catalogue contents a classification of the damages and detailed descriptions for several types of damages. The classification also takes into account the type of structure and the design material.

These developed instruments enables effective decisions regarding the type of measures, the time of measures and enables also a realistic assessment of the structure state. Typical measures are the rebuilding, the maintenance and modification of the structure.

The aim of this contribution is to present the current state of the Austrian Standard Rule (ONR), and to discuss the developed monitoring concepts in a critical manner, which in consequence also has to focus on the basic instruments for inspection and assessment. The authors invite the community of maintenance and preservation of structures to contribute with critical aspects.